C. COSTING APPROACH

1. Materials Investments

a) In General

Q. How were material investments developed for the switching study?

A. The material investments for the switch were developed using the Switching System Cost Information System ("SCIS") model developed by Telecordia (formerly known as Bellcore). SCIS is a computer system that determines the basic material investments of switches. It includes basic switch investments and the processor related investments associated with features that do not require any specific, unique hardware. It also allocates traffic efficiently between host and remote switches.

Q. How did Verizon MA utilize SCIS in its study?

A. SCIS/Model Office ("SCIS/MO") lets the user "build" (*i.e.*, specify) a model office, which is representative of a typical office in the network. It then determines for that model office the basic switching investments. Existing office parameters, adjusted to make them forward-looking, were provided by Verizon MA's engineering organization for each existing switch in Massachusetts, and were used to create SCIS model offices for both DMS-100 and 5ESS

technology. SCIS then calculated, by switch technology type, unit and total switch material investments for both of the two technologies.

Q. What inputs were used for the SCIS runs?

A. Inputs were derived from Verizon MA's existing switches, then adjusted to make them forward-looking. For each switch, 25 percent of the lines were designed on GR-303 peripherals; all remaining lines were designed on the latest available analog line peripherals; and all trunks were designed on the latest available trunk peripherals. In addition, the current number of lines and trunks per switch were adjusted based on the Verizon MA's access line growth forecast, and the averages CCS per line and trunk were adjusted based on current CCS growth trends.

Q. What version of SCIS was used for Verizon MA's study?

A. The latest available version of SCIS/MO – Version 2.8 – was used.

Q. How does SCIS take account of vendor prices for switching equipment?

A. Vendor list prices are built into each version of SCIS. The vendor discounts offered to particular companies are inputs supplied by the user when SCIS is run.

2. Discount

Q. What components are included in Local Switching investment and how were they determined?

A. The discounted material investments for Local Switching and their total investments were broken into three components: Line Terminations (or Ports), Trunk Terminations (or Ports), and Usage. These were determined from the SCIS output reports for each technology. The discounted material investments for each technology were then melded together using the forward-looking ratio of switching technology mix. These investments were then adjusted by the appropriate forward-looking utilization factors.

a) Switch Discounts in the Vendor Contracts

Q. Please describe the switching vendors' discount structure in the currently effective contracts under which 5ESS and DMS-100 switching equipment is provided to Verizon.

A. The contracts that Verizon has with its switch vendors are very complex and have various discount levels for different types of equipment. For example, there are different levels of growth discounts on peripherals that provide GR303 interfaces, versus peripherals that provide analog interfaces. In addition, depending on

the type of material, Nortel's contract has a two-tier discount level, one for new (or replacement) switches, and another for additions (or growth) to existing switches. To further add to the complicated discount structures, the contracts also specify "Verizon" prices for specific types of equipment, without directly specifying a "discount". It is important to note that for both vendors' contracts, there is no longer one single discount specified that is applicable for new (or "replacement") switches and another single discount specified for all types of "growth" equipment. Both vendors have a multitude of discounts offered, which depend on both types of equipment purchased, and volumes.

Q. At one point in time, didn't both vendors have a two-tier discount structure, that is, one for new or "replacement" switches, and another for "growth" purchases?

A. Yes. The original NYNEX Megabid contracts with both Lucent and Nortel had such a two-tier discount structure. The current contract with Lucent no longer has a two-tier discount structure. And the current Nortel contract new or "replacement" discount is very close to its growth discounts.

Q. Please explain what is meant by a two-tier discount structure versus a

one-tier discount structure.

A. The Megabid contracts were originally negotiated with Verizon's switching vendors (Nortel and Lucent) in 1993 during a period when Verizon - North (the former NYNEX) was replacing its analog switches. In order to accommodate the replacement program, both vendors negotiated a two-tier discount structure in their contracts. One discount applied to growth additions, the other, a steeper discount, applied to new switch purchases. The reality is that as we move into the future the vendors will no longer offer a two-tier discount structure such as they did in Megabid. Lucent has already revised its two-tier discount structure specified in Megabid and replaced it with a one-tier discount structure.

Q. What factors would tend to favor phasing out of two-tier discounts?

A. The Company and its vendors know that Verizon will upgrade and grow its *existing* digital switches in the future, not replace them. Such a structure provides Verizon with a competitive pricing structure on the types of switching purchases it will most likely *actually* make in the future.

Q. Please outline the existing switch contracts that Verizon has in place with Nortel and Lucent.

A. As previously mentioned, the former NYNEX originally signed Megabid contracts with both vendors back in 1993 that are applicable until 2003. However, since 1993 there have numerous amendments to both contracts, in addition to separately negotiated smaller contracts.

The former Bell Atlantic (prior to the NYNEX merger) and the former GTE (prior to the Bell Atlantic merger) also had contracts in place with each vendor. For Nortel, Verizon signed three agreements in December 2000 which specify specific prices for which Verizon – North (formerly NYNEX), Verizon – South (formerly Bell Atlantic), and Verizon – West (formerly GTE) will pay for switching equipment through 2003. The net prices and estimated purchase quantities of equipment are listed in Attachment "C" in each of the agreements. Attachment "C" in both the Verizon – North and Verizon – South agreements are the same.

For Lucent, amendments were signed to the contracts covering Verizon – North and Verizon – South in January 2000 that specified the same changes to the discount levels in both contracts. An additional amendment to the Verizon – South contract was signed in September 2000 which added the Verizon – West (former GTE) to

that contract.

b) Appropriate Switch Discount for TELRIC Switching Studies

Q. What is the appropriate vendor material discount to use in the switching cost studies?

A. The appropriate material discount to use is the discount that Verizon can *actually receive* when deploying switching equipment in the foreseeable future.

Q. Why is the use of a discount that is based on the actual discount Verizon can actually receive appropriate for TELRIC studies?

A. The actual discount that Verizon will receive when purchasing the latest available digital switching technology in the future is appropriate for determining TELRIC switching costs for the following reasons:

1. In the Consolidated Arbitrations, the Department consistently approved cost studies that incorporated the latest technology being deployed in Verizon MA's network, with material prices based on the latest negotiated Verizon MA-vendor contracts for that material. In effect, the Department found that the appropriate material price to use in a TELRIC cost study is the material price Verizon MA will actual pay, incrementally, in the

foreseeable future, under current vendor contracts, for the particular equipment being costed. For example, the IOF Transport costs that were approved by the Department in Phase 4 of the Consolidated Arbitrations were based on the incremental cost Verizon incurs to purchase SONET equipment. Verizon MA does not believe that the Department should treat the switching material prices in a different manner than any other material prices associated with any other type of UNE being studied.

2. The forward-looking switching technology which represents the basis of the switching costs presented here will be deployed by the Company in the future, incrementally, at the discount rates Verizon actually receives. The forward-looking switch construct used to develop the costs is made up of the latest available processors, trunk peripherals, and line peripherals. This construct *does not* represent the mixture of switching equipment components Verizon has currently deployed in its network. It represents the mixture of switching equipment components Verizon is purchasing incrementally to upgrade and expand its switching network, on a forward-looking basis.

The discount that Verizon will receive when purchasing this equipment, as specified by the current contract Verizon has with the suppliers of this equipment, is not a "replacement" (or new switch) discount that would only apply to purchases of entire switches. Since Verizon has already fully deployed digital switches in its network, using the "replacement" discount would be totally inappropriate and inconsistent with the TELRIC methodology as previously determined by the Department for all other unbundled elements. This is also supported by a very recent decision of the United States District Court for the Northern District of New York, in which the court concluded that forward-looking costs determinations "must be based on the incremental costs that an incumbent local service provider actually incurs or will incur".[30]

3. On a forward-looking basis, Verizon has no plans to "replace" its existing end office digital switches with new end office digital switches.

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[30] *MCI Telecommunications Corp. v. New York Telephone Co.*, No. 97-CV-1600, slip op. At 25 (N.D.N.Y. March 7, 2001).

Q. Please explain why the contractual new-switch discounted prices should not be used to develop Verizon's TELRIC switch costs?

A. The concept that switch prices should be based on the cost of switching under the scenario that all of the switches could be replaced at the exact same moment in time is not reasonable. Verizon's switching cost studies are based on a "hypothetical network" based on a forward-looking technological configuration that Verizon MA may never actually achieve (*i.e.*, 25 percent GR-303). Nevertheless, the cost of that hypothetical configuration must be anchored to some form of reality. And the reality of any technological advancement is a gradual, well-planned evolution that takes place over a period of time. And that is exactly how the evolution of digital switching has occurred. Even if one were attempting to capture only the first time costs, using the Megabid "new switch" discounts, applied against today's switching material investments, would not come close to estimating switching investments necessary to rebuild Verizon's *entire* switch network.

Q. Is it realistic to assume that the price for a one-time replacement of all of Verizon's switches would be lower than the prices that it currently pays?

A. No. In the Consolidated Arbitrations, the Department concluded that "it is speculative to assume what the manufacturers' discounts would be if a TELRIC network were being constructed today"[31]. This is also clearly illustrated by the Ford - Bridgestone/Firestone tire recall, in which it was necessary to accomplish what could be thought of as a "scorched node" instant replacement of 6.5 million tires. In an attempt to speed up the replacement, Bridgestone/Firestone even commissioned its competitors, including Goodyear, Michelin, and Uniroyal, to manufacture replacement tires. Even with four of the world's biggest tire manufactures maximizing production, and a possible life and death situation, the entire recall is estimated to take until the *Spring of 2001*. Does anyone really believe that the recall is going to cost Bridgestone/Firestone incrementally less per tire than it would to manufacture the replacement tires under normal circumstances? To the contrary it has been estimated that it will cost an additional $60/tire to airlift them from Japan, and there will be an additional premium of $350 million, to accelerate the completion of

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[31] D.P.U 96-73/74, 96-75, 96-80/81, 96-83, 94-94- Phase 4, Order Dated December 4, 1996 at 37.

the recall by the end of this year, instead of sometime in 2001. The bottom line is that its vendors would not be able to offer steep discounted prices if the Company were to competitively bid the hypothetical scenario of replacing all of its switches at one point in time. More likely, the vendors costs would be substantially higher in order to meet the demand requirements of such a massive undertaking.

Q. But wouldn't the Megabid replacement discounts represent close to what Verizon might realize if it were going to replace its entire switch network?

A. No. The Megabid contracts covered the purchase of 3.46 million lines, or only approximately 31 percent of Verizon - North's (the former NYNEX region) access lines purchased after 1993. Yet Verizon - North started its digital switch deployment back in 1985. Therefore, approximately 69 percent of Verizon – North's access lines were *not purchased* with the steep Megabid discounts. Megabid replacement discounts were a one-time event and should not be used as the basis for determining TELRIC switching costs. The actual discount Verizon will actually receive going forward is the proper TELRIC discount to use in its switching costs studies.

Q. Are the estimates of materials investment that are based on the discounts that Verizon will actually receive conservative?

A. Yes. As explained in more detail below, over time Verizon continues to upgrade the different component parts of Verizon's digital switches. Regulatory mandates and vendor enhancements continually drive network additions and modifications. The forward-looking material investments presented here do not capture future switch-related costs Verizon will have to incur to meet such regulatory requirements.

Q. Is it appropriate to apply a discount that Verizon will actually incur in the future to the getting started equipment, or first cost of the switch, since this portion of the switch is allegedly purchased with the initial installation at the new switch discount?

A. Using a discount Verizon MA will actually incur against all switch investment provides a reasonable estimate of the forward-looking investment associated with its UNE switching costs. The switching network is by no means stagnant. Verizon has and will continue to replace the majority of the switch's components, and it will be at the discount level it actually receives for those replacements.

Q. Can you give examples of the scope and costs of these upgrades?

A. Yes. Verizon's history has shown that over time virtually every

component of the DMS-100 and 5ESS switch has needed to be expanded or changed out; even the latest vintages of equipment will become obsolete. The trunk and line terminations grow linearly with demand. The common equipment reaches exhaust or obsolescence and must be upgraded or replaced.

The vendors continue to upgrade and enhance the basic building blocks of the switches. Verizon incorporates these changes into its network for various reasons including:

- Manufacturer discontinued products — Vendors upgrade equipment and discontinue support to the vintage predecessor equipment. Verizon is required to upgrade the hardware to keep within the guidelines of the vendor's support policy.

- Regulatory requirements for features — Regulatory requirements often necessitate the addition of software and memory as well as changes in hardware designs to provide for the mandates of the regulatory bodies. Some regulatory requirements include CALEA, Local Number Portability and Interchangeable NPAs.

- Increased demand for new software intensive features and services demanded by the public require changes in the basic

building block components of the switch including memory upgrades, new software releases, faster processors and larger pipes connecting peripherals.

The following is a summary of the infrastructure upgrades required to upgrade the common equipment in Massachusetts from July 1999 through April 2001.

Infrastructure Upgrades

Verizon Massachusetts, 7/99 to 4/01

Planning $		Description of Upgrade
$74,881		Lucent CM1-CM2
406,124		Umbilical Relief
131,722		NPA Code Splits
5,596,501		Lucent 3B20-3B21
430,440		Lucent SMP23 Upgrades
1,122,077		Lucent 5E12
9,039,924		Lucent 5E13
10,843,311		Lucent 5E14
1,238,354		5E11 thru 5E13 Software
10,087,716		Lucent Remote Replacement
96,306		Specific Software/Hardware for CALEA
550,000		CM2 Bay Expansions
900,102		DMS-10 Generic 501
729,674		DMS-10 Replacement
913,940		Nortel NA010
411,257		Nortel NA011
2,832,807		Nortel NA012
39,600		Nortel NA014
421,669		Supernode Upgrades
954,041		Nortel Remote Replacement

1,383,643		ENET Upgrades
2,165,685		Nortel AIN Platform Features Option 1
$50,369,774		**Total Infrastructure Upgrades**

In addition, Lucent and Nortel have provided information on their required gating hardware upgrades for their respective switch platforms.

Q. Can you give some example of the various types of switching equipment purchased with the initial switch that most people believed would never be expanded or replaced over time?

A. Yes. The following are examples where Verizon has grown, or replaced equipment that most people believe never need to be expanded or replaced in the switch:

- **Administrative Module (5ESS)** — Hardware upgrades (memory) to the Administrative Module (AM) have been required with every Software Release. There have been multiple offices where the AM — model 3B20 processor needed replacement with a 3B21 model for load relief. Specifically, Greendale, Amherst, Concord and Middleboro are examples of Massachusetts offices where the model 3B20 processor was replaced with a 3B21. With the 5E14 generic release, the 3B20 to 3B21 processor replacement is required in all

offices to provide capacity for increased memory requirements. With 5E13, the Administrative Services Module was introduced which is an architectural improvement over the AM.

- The **Communications Module (CM)** has evolved from CM-1 to CM-2. The CM-2 is required with 5E14. Additional pairs of CM-2 bays are required when the peripheral equipment added exceeds the capacity of the current CM-2 bays. Framingham and Milford are examples where additional CM-2 bays were required.

- **Recorded Announcement System (5ESS)** — The 13A analog broadcast announcement units were manufacturer discontinued in 1995. The replacement 16A digital announcer provides for an increase in announcement capability utilizing digital trunk access. Announcement units were changed out in Quincy, Hingham and Great Barrington.

- **Maintenance and Test equipment (5ESS)** — New test sets have been required to test new services. The Operations, Administration and Maintenance software was enhanced with 5E7.

- **Quad Link Packet Switch (5ESS)** — This was an enhancement to

the CM-2 architecture that was introduced in 5E9.2. The Quad Link Packet Switch (QLPS) is being installed when the first Switch Module (SM) 2000 is added to the office. Verizon is continuing to incur expense associated with provisioning the QLPS in conjunction with growing SM2000 in the network.

- **Gateway Processor (5ESS)** — The Gateway Processor interfaces with the AM and classic SMs. It also interfaces with the QLPS for SM-2000 communications. Verizon is currently adding Gateway Processors in conjunction with the QLPS when the first SM-2000 is added to an office.

- **Core Cabinet with Message Switch (DMS-100)** — The gating hardware for the Message Switch was 7MB minimum for generic NA003. With NA004, the minimum requirement increased to 16MB. With generic NA007 and NA008, message switch memory was increased to 24 MB. Offices require NA007 for Local Number Portability and NA008 for year 2000 compliance.

- **Computing Module (DMS-100)** — Supernode (SN) 50 was required to load NA006. Effective with NA007, NT40 is no longer supported and SN60 processors are required with increased memory

requirements of 96M cards. Upgrade of the memory cards from 24M to 96M requires a minimum of four 96M cards per side for a total of eight 96M cards per Computing Module. This requirement has increased to five cards per side or ten 96M card per Computing Module with generic NA0010.

- **System Load Module (DMS-100)** — With NA003, System Load Module (SLM) II were required for SN offices and SLM1A were required with SNSE offices. With NA006, SNSE offices required 9X44AD SLM III. Effective with NA008, SLM IIIs are required for all SN offices of greater than 95K lines. Effective with NA010, SLMIII are required in all offices.

- The **Nortel processor** evolution will migrate from SN70 to XA Core. With the XA-Core upgrade, the existing processor, memory and system load modules of the DMS supernode will be replaced.

- **Input/Output Equipment (DMS-100)** — The Input/Output controller was manufactured discontinued on 2/28/00. The replacement hardware is the Integrated Services Module (ISM). Verizon was required to upgrade to the ISM in various locations as additional input/output ports have been needed for additional SMDI, SMDR and

voice messaging links.

- **Maintenance and Test Equipment (DMS-100)** — The Line Test Unit (LTU) has been replaced by the Metallic Test Unit (MTU) to provide increased capacity. Nortel documentation states that this feature is in the process of evolution with enhancements to be provided in the near future.

c) Methodology for Determining Appropriate Discount

Q. Given the complexity of the switch contracts, please describe the methodology that is appropriate to determine the switch discount that the Company will actually receive when deploying switching equipment?

A. The best method to determine the switching discount Verizon will receive in the foreseeable future is to examine the overall actual discount experienced by the Company for recent purchases of switching equipment under the current contracts. Some of the reasons why this is the most appropriate methodology to determine the forward-looking switch discount are:

1) It is the overall discount Verizon actually receives (and will continue to receive) when purchasing switching equipment under

its current contracts;

2) It is based on the mix of equipment that Verizon is actually deploying in its network, including all types of switching equipment such as processors, trunks, lines, and peripherals.

3) It captures all "credits" offered within the contracts;

4) It is determined from the actual material prices Verizon paid for switching equipment, not someone's interpretation of Verizon's complex contracts or hypothetical model; and

5) It is determined exclusively from vendor supplied data concerning their list prices and discount prices of switching equipment (hardware) sold to Verizon.

Q. Please describe how this was accomplished.

A. Verizon asked each of its switching vendors to provide detailed information of all switching equipment (hardware) purchases Verizon made during the past year (2000), including actual quantities, list prices, as well as the prices Verizon paid for the equipment. From this information, the Company calculated an overall effective discount it actually received during the timeframe the actual purchases were made, by comparing the total list price of all purchases made versus the *actual* total price paid.

Q. What is meant by "list prices"?

A. For the purposes of this study, "list prices" refers to the undiscounted published list prices offered by each vendor to the general public as their prices for the equipment. Since these are the prices that are built into SCIS, care must be taken to ensure that the starting point for the determination of the discount used for the Company's switching studies must be the "list prices".

Q. Please describe the Lucent actual purchase data and how it was used to determine the Lucent forward-looking switch discount.

A. Lucent provided the Company with its equipment purchases[32] for the entire year 2000 for Verizon – East's states[33]. The overall effective discount the Company received during this timeframe was developed by summarizing these purchases. The discount shown on Line 1 of Proprietary Exhibit Part C-P1 is the Lucent discount the Company used to develop its switching costs.

Q. Please describe the Nortel purchasing data and how they were used

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[32] Excluding 10% of the lowest dollar value orders.

[33] Excluding 3 months of New Hampshire data which was not available at the time of this filing.

to determine the Nortel forward-looking switch discount.

A. Nortel provided the Company with its equipment purchases for the entire year 2000, for Verizon. The overall effective discount the Company received during this timeframe was developed by summarizing these purchases. However, since Verizon signed new agreements in December 2000, the Company did not use the discount based on purchases to develop its switching costs, because it does not capture the latest material prices available to Verizon by Nortel. As previously described, the Nortel contracts signed in December 2000 included an Attachment "C" that depicts the equipment prices the Verizon will pay for equipment purchased under the contract, along with estimated quantities of this equipment. Under a separate cover, Nortel also provided the Company with Attachment "C" depicting the resulting discount level of each of the equipment listed. The overall estimated discount was developed by summarizing the purchases shown in Attachment "C". The Company believes this discount represents an appropriate estimate of the forward-looking discount Verizon – East will actually incur under the latest contracts with Nortel. This is the Nortel discount the Company used to develop its switching costs, which are shown on Line 2 on

Proprietary Exhibit Part C-P1.

Q. How were the equipment quantities shown in Attachment "C" determined?

A. The types of equipment and quantities shown in Attachment "C" were determined by the Company's switch planners, and represents their best estimate as to what the Company will be purchasing over the next three years from Nortel.

Q. How does the calculated discount developed from the Nortel contract used in the Company's cost studies compare to the discount developed from the Verizon's actual Nortel purchases for the year 2000?

A. The discount developed from the latest Nortel contract is greater than the discount developed from Verizon's actual Nortel purchases in the year 2000.

Q. Are the forward-looking discounts appropriate for both end office and tandem switches?

A. Yes. Since the actual purchases included both tandem and end office switching equipment, the discounts are appropriate for both.

3. Utilization

Q. How is utilization accounted for in the switching studies?

A. Consistent with the definition used through out these studies, working as a percent of total installed capacity, switching utilization is accounted for by each type of equipment investment (digital line ports, analog line ports, and digital trunk ports). Utilization was not applied against usage investment.

Q. How was the forward-looking utilization for digital trunk ports determined?

A. Trunks are added using building blocks of digital DS1 interfaces (24 voice grade trunks per DS1). Therefore, the utilization factor for DS1 trunks is determined by the need to maintain a minimum 5 percent administrative spare capacity, and the rate of consumption of spare growth capacity. A switch trunk addition is engineered and ordered to complete when 95 percent of the DS1 trunk capacity is forecasted to be working. The typical trunk addition provides for approximately 10 percent added capacity. It is reasonable to expect the average trunk utilization over the entire universe of switches to be evenly distributed between those that have just had an addition and those just under 95% utilization. This yields an average trunk DS1 utilization of 90 percent for the forward looking design.

Q. How was the forward-looking utilization for digital line ports